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ABSTRACT

Relationships between reading achievement and perceptual skills as measured by selected subtests of the Detroit Tests of Learning Aptitude were investigated in a sample of 73 second graders. Verbal opposites, visual memory for designs, and visual attention span for letters were significantly correlated with both word meaning and vocabulary comprehension. Motor speed and auditory memory span were in general not significantly related to either reading measure. Results are used to question such subtests as bases to the prescription of instructional programs compatible with each child's best-developed aptitudes. (AA)

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THE RELATIONSHIP BETWEEN SELECTED SUBTESTS OF THE DETROIT TESTS OF LEARNING APTITUDE AND SECOND GRADE READING ACHIEVEMENT

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In recent years, both state and federal governments have expended large amounts of money in their efforts to improve elementary school reading instruction. Innovative programs, new materials and equipment, and a variety of approaches to grouping and teaching have been proposed and implemented. Despite these attempts, large numbers of pupils fail in learning to read every year. In Mississippi, annual state-wide tests have shown a steady decline in children's performance for the past four years.

Currently, there is considerable interest across the country in matching reading approaches and instructional materials to children's perceptual skills. Many reading specialists believe that failure rates can be reduced by a diagnostic-prescriptive reading program which emphasizes instruction compatible with each child's best-developed sensory modality.

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A diagnostic battery frequently used for ascertaining the relative functioning of children's visual, auditory, and motor skills is the Detroit Tests of Learning Aptitude (DTLA). Although the DTLA has been used by reading specialists for more than 30 years, its validity as a predictor of reading performance has never been demonstrated adequately. The extent to which each of its subtests measures a factor which contributes to reading achievement has not been determined. However, such research is sorely needed if reading teachers and clinicians continue to base instructional programs on DTLA results.

Related Research

The past decade has seen increasing concern for the development of basic perceptual skills as a prerequisite for beginning reading instruction. Considerable attention has been devoted to the relationship between visual skills and reading (Bryan, 1964; Barrett, 1965), to visual perception testing (Frostig, Lefever & Whittlesey, 1963; Maslow, Frostig, Lefever & Whittlesey, 1964; DeHirsch, Jansky & Langford, 1966), and to training programs for improving visual perception (King, 1964; Van de Riet & Van de Riet, 1964; Gorelick, 1965). Many public and private schools have added visual and visual-motor skill development activities to their primary grade programs as a result.

The existence of interrelationships among the several language functions (speech, hearing, reading, and writing)

has long been recognized. The classic research of Bond (1935), which showed a significant relationship between auditory problems and poor reading, has been replicated and extended by several investigators in the past decade. Sonenberg and Glass (1965) studied the speech and hearing of 40 remedial reading students between the ages of 7 and 16, and found that 95% had speech defects, compared to 10% or less in the normal school population. Tests of auditory discrimination showed that 47% of the remedial readers with functional speech problems were weak in this ability.

Muehl and Kremenak (1966) investigated pre-reading auditory and visual matching skills, and then related these findings to later achievement in reading. They found matching visual items to be comparatively easy for most children, and auditory matching most difficult. For the children participating in the study, the general ability to relate information from the auditory to the visual sense, with intelligence controlled, was significantly associated with later reading achievement. The authors concluded that their evidence pointed to the need for early identification of children deficient in the capacity for integrating their auditory and visual sense perceptions.

Sandstedt (1964) studied the memory spans of 45 children who were severely retarded in reading. Using the DTLA, she found that the subjects were more successful with the visual test of unrelated objects than with the auditory

test of unrelated words.

The present early emphasis on intensive phonics approaches suggests that there is a need for assessment and improvement of auditory abilities if children are to succeed in beginning reading. Wepman (1961) found that children have different levels of development in their auditory skills during the first three years of school. He noted that training in the discrimination of auditory patterns appeared to hasten the developmental process.

Difficulty in the application of auditory-related skills was noted by MacGinitie (1974). He found that while first-grade children could memorize phonics rules they had minimal success in applying the generalizations to actual reading situations.

Manning (1966) found a significant superiority in two treatment groups which received individualized skill instruction in comparison with a control group which followed the directions in a basal manual. He concluded that intensive instruction in specific auditory and visual discrimination skills was effective in promoting readiness for reading. This is supported by studies conducted by Wise (1965), Kellogg (1967), and Silvaroli and Wheelock (1966).

Although reading disability is widespread in the United States, there is ample evidence that the percentage of children who fail in reading is much greater in areas with low socio-economic levels. A possible cause is the fact that

disadvantaged children are less able to make effective use of the language met in school. Worley and Story (1967) tested 40 first-grade children with the Illinois Test of Psycholinguistic Abilities. The pupils were divided into high and low socio-economic levels, and were matched in age, race, sex, and physical health. The investigators found the high socio-economic group to be 14 months above the disadvantaged group in language facility (defined as "the ability to verbalize ideas, to comprehend auditory and visual symbols, and to relate symbols in a meaningful way"). The 14 month difference between the groups was significant beyond the .01 level.

A recent review, however (Newcomer & Hammill, 1975), concluded that research thus far has not been able to establish the relevance of the ITPA for diagnosis, academic planning, or early identification of children who are likely to have problems in learning basic reading skills. Auditory association seemed to have a relationship to reading and arithmetic, but visual association did not.

Procedure

During the spring of 1975, a sample of seventy-three subjects was selected from second graders enrolled in Bramlett Elementary School, Oxford, Mississippi. A stratified random sampling procedure was used to select subjects for the study. The three strata were based upon reading achievement scores from the previous academic year, and a table of random numbers

was used to select the subjects from each stratum. Five subtests of the DTLA (verbal opposites, motor speed, auditory attention span for unrelated words, designs, and visual attention span for letters) were administered individually to the subjects by trained examiners in separate rooms. The noise factor, therefore, was at a minimum. Near the end of the semester, the Stanford Achievement Test, Level I, was administered in group form to the subjects to establish a reading level for each subject.

Six variables were utilized in the study. The five predictor variables were selected from the DTLA (verbal opposites, motor speed, auditory attention span for unrelated words, designs, and visual attention span for letters). The criterion variable was the subject's reading level as measured by the Stanford Achievement Test.

At the termination of the collection of the data, multiple regression and correlational techniques were applied to the five sub-predictor variables and the criterion variable. The BMDO2R "Stepwise Regression" statistical program on the DECSYSTEM-10 computer at the University of Mississippi Computer Center was used to analyze the relationship among these variables. The F-ratio level for inclusion of a variable in the stepwise regression program was .05. The F-ratio for deletion was .30, and the tolerance level was .001. A Fisher's t test was used to test the correlation coefficients for significance.

Presentation and Analysis of Data

The analysis of data in this study was undertaken primarily to investigate the relationship between selected subtests of the DTLA and reading achievement as measured by the Stanford Achievement Test. The computed correlation coefficients between scores from the five selected subtests of the DTLA and reading achievement scores in terms of word meaning and paragraph comprehension were significant beyond the .05 level. However, due to the low multiple R values (.76 - .82) obtained, precise prediction was not possible.

Shown in Table 1 are the correlations between the five subtests of the DTLA and word meaning for second graders. An r of .23 was required for significance at the .05 level.

Table 1

Correlations Between Five DTLA Subtests and Word Meaning for All Second Grade Subjects

Variables	Ver. Opp.	M. Speed	Aud. Att.	Designs	Vis. Att.
Word Meaning	.67**	-.03	.13	.51**	.55**

N = 73
df = 71
* Required r at the .05 level of significance = .23
** Required r at the .01 level of significance = .30

Inspection of Table 1 reveals that verbal opposites, designs, and visual attention span for letters are significantly

related to word meaning.

Table 2 presents the correlations between the selected subtests of the DTLA and paragraph comprehension. Again, an r of .23 was required for significance at the .05 level.

Table 2

Correlations Between Five DTLA Subtests and Paragraph Comprehension for Second Grade Subjects

Variables	Ver. Opp.	M. Speed	Aud. Att.	Designs	Vis. Att.
Word Meaning	.74**	-.14	.14	.59**	.56**

N = 73
df = 71
* Required r at the .05 level of significance = .23
** Required r at the .01 level of significance = .30

Examination of Table 2 shows a significant relationship between verbal opposites, designs, and visual attention span for letters and paragraph comprehension.

To determine the relationship between the five selected subtests from the DTLA and measures of reading achievement in terms of the subject's sex and race, further analysis of the data was carried out. Tables 3 through 10 report the results of this analysis.

Shown in Tables 3 and 4 are the correlations between the subtests of the DTLA and word meaning for second grade males and females. An r of .30 was required for significance at the

.05 level for male Ss and .35 for female Ss.

Table 3

Correlations Between Five DTLA Subtests and Word Meaning for Second Grade Males

Variables	Ver. Opp.	M. Speed	Aud. Att.	Designs	Vis. Att.
Word Meaning	.79**	-.04	.07	.56**	.59**

N = 42
df = 40
* Required r at the .05 level of significance = .30
** Required r at the .01 level of significance = .39

Table 4

Correlations Between Five DTLA Subtests and Word Meaning for Second Grade Females

Variable	Ver. Opp.	M. Speed	Aud. Att.	Designs	Vis. Att.
Word Meaning	.52**	-.09	.23	.47**	.41**

N = 31
df = 29
* Required r at the .05 level of significance = .35
** Required r at the .01 level of significance = .45

Inspection of Tables 3 and 4 reveals that verbal opposites, designs, and visual attention span for letters are significantly related to word meaning for second grade males

and females.

In Tables 5 and 6 correlations are shown between the subtests of the DTLA and paragraph comprehension for second grade males and females. An r of .30 was required for significance at the .05 level for male Ss and .35 for female Ss.

Table 5

Correlations Between Five DTLA Subtests and Paragraph Comprehension for Second Grade Males

Variables	Ver. Opp.	M. Speed	Aud. Att.	Designs	Vis. Att.
Word Meaning	.82**	-.08	.00	.59**	.61**

N = 42
df = 40
* Required r at the .05 level of significance = .30
** Required r at the .01 level of significance = .39

Table 6

Correlations Between Five DTLA Subtests and Paragraph Comprehension for Second Grade Females

Variables	Ver. Opp.	M. Speed	Aud. Att.	Designs	Vis. Att.
Word Meaning	.65**	-.26	.33	.60**	.42**

N = 31
df = 29
* Required r at the .05 level of significance = .35
** Required r at the .01 level of significance = .45

Examination of Tables 5 and 6 shows that verbal opposites, designs, and visual attention span for letters are significantly related to paragraph comprehension for second grade males and females.

Tables 7 and 8 show the correlations between the DTLA subtests and word meaning for second grade black and white Ss. An r of .35 was required for significance at the .05 level for black Ss and .30 for white Ss.

Table 7

Correlations Between Five DTLA Subtests and Word Meaning for Second Grade Black Ss

Variable	Ver. Opp.	M. Speed	Aud. Att.	Designs	Vis. Att.
Word Meaning	.44*	.13	.04	.27	.47**

N = 31
df = 29
* Required r at the .05 level of significance = .35
** Required r at the .01 level of significance = .45

Table 8

Correlations Between Five DTLA Subtests
and Word Meaning for Second Grade White Ss

Variable	Ver. Opp.	M. Speed	Aud Att.	Designs	Vis. Att.
Word Meaning	.60**	--.05	.07	.46**	.59**

N = 42
df = 40
* Required r at the .05 level of significance = .30
** Required r at the .01 level of significance = .39

Inspection of Table 7 shows that verbal opposites and visual attention span for letters are the only subtests that are significantly related to word meaning for black second graders. Table 8 reveals that verbal opposites, designs, and visual attention span for letters are significantly related to word meaning for white second graders.

Shown in Tables 9 and 10 are the correlations between the DTLA subtests and paragraph comprehension for second grade black and white Ss.

Table 9

Correlations Between Five DTLA Subtests and Paragraph Comprehension for Second Grade Black Ss

Variable	Ver. Opp.	M. Speed	Aud. Att.	Designs	Vis. Att.
Word Meaning	.51**	-.16	.19	.51**	.53**

N = 31
df = 29
* Required r at the .05 level of significance = .35
** Required r at the .01 level of significance = .45

Table 10

Correlations Between Five DTLA Subtests and Paragraph Comprehension for Second Grade White Ss

Variable	Ver. Opp.	M. Speed	Aud. Att.	Designs	Vis. Att.
Word Meaning	.69**	-.06	.02	.49**	.60**

N = 42
df = 40
* Required r at the .05 level of significance = .30
** Required r at the .01 level of significance = .29

Summary and Conclusions

Of the five DTLA subtests used in the study, three showed consistent significant correlations with the criterion tests. Verbal opposites, visual memory for designs, and visual

attention span for letters were correlated with both word meaning and paragraph comprehension beyond the .01 level of significance for all groups.

The motor speed and precision subtest generally resulted in a small non-significant negative correlation with the criterion measures. Auditory memory span approached significant correlation (.05 level) with paragraph meaning for females only.

The results of the present study raise serious questions about the value of modality testing in general and the validity of the DTLA in particular for children in the rural South. It may be that the experiential and dialect differences between the urban Northern pupils in the normative group and the population in the study invalidate some of the subtests used. Certainly, further research is needed if the practice of basing prescriptive remedial programs on DTLA subtest scores is to be continued.

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